

REMARKS

This is a full and timely response to the final Office Action (Paper No. 13) mailed by the U.S. Patent and Trademark Office on November 28, 2001. Claims 1-28 remain pending in the present application. Independent claims 1, 10, 15 and 24 have been amended. In view of the foregoing amendments and following remarks, reconsideration and allowance of the present application and claims are respectfully requested.

Rejections Under 35 U.S.C. §112, Second Paragraph

Claims 1-14 stand rejected under 35 U.S.C. §112, Second Paragraph, as allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention.

It is alleged in the Office Action that:

In this case, independent claims 1 and 10 recite a limitation "a thickness sufficient to prevent excessive current in the vicinity of a short in said organic light emitting device". Here, it is not clear how much thickness is sufficient to prevent excessive current in the vicinity of a short. Further the specification does not provide any insight as to what extend of value of the thickness of the self-limiting structure is sufficient to prevent excess current in the vicinity of a short. This renders the claim indefinite.

Applicants have amended independent claims 1 and 10 to remove the language that specifies that the current self-limiting structure be "applied in a thickness sufficient to prevent excessive current in the vicinity of a short in said organic light emitting device."

Accordingly, Applicants respectfully request that the rejection under 35 U.S.C. §112, Second Paragraph, be withdrawn.

Rejections Under 35 U.S.C. §102

Claims 1-14 stand rejected under 35 U.S.C. §102(e) as allegedly being anticipated by U.S. Patent No. 5,920,080 to Jones. A proper rejection of a claim under 35 U.S.C.

§102 requires that a single prior art reference disclose each element of the claim. *See, e.g., W.L. Gore & Assoc., Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 U.S.P.Q. 303, 313 (Fed. Cir. 1983). Anticipation requires that each and every element of the claimed invention be disclosed in a single prior art reference. *See e.g., In re Paulsen*, 30 F.3d 1475, 31 USPQ2d 1671 (Fed. Cir. 1994); *In re Spada*, 911 F.2d 705, 15 USPQ2d 1655 (Fed. Cir. 1990). Alternatively, anticipation requires that each and every element of the claimed invention be embodied in a single prior art device or practice. *See, e.g., Minnesota Min. & Mfg. Co. v. Johnson & Johnson Orthopaedics, Inc.*, 976 F.2d 1559, 24 USPQ2d 1321 (Fed. Cir. 1992). The test is the same for a process. Anticipation requires identity of the claimed process and a process of the prior art. The claimed process, including each step thereof, must have been described or embodied, either expressly or inherently, in a single reference. *See, e.g., Glaverbel S.A. v. Northlake Mkt'g & Supp., Inc.*, 45 F.3d 1550, 33 USPQ2d 1496 (Fed. Cir. 1995). Those elements must either be inherent or disclosed expressly. *See, e.g., Constant v. Advanced Micro-Devices, Inc.*, 848 F.2d 1560, 7 USPQ2d 1057 (Fed. Cir. 1988); *Verdegaal Bros., Inc. v. Union Oil Co.*, 814 F.2d 628, 2 USPQ2d 1051 (Fed. Cir. 1987). Those elements must also be arranged as in the claim. *See, e.g., Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 9 USPQ2d 1913 (Fed. Cir. 1989); *Carella v. Starlight Archery & Pro Line Co.*, 804 F.2d 135, 231 USPQ 644 (Fed. Cir. 1986). For anticipation, there must be no difference between the claimed invention and the reference disclosure, as viewed by a person of ordinary skill in the field of the invention. *See, e.g., Scripps Clinic & Res. Found. v. Genentech, Inc.*, 927 F.2d 1565, 18 USPQ2d 1001 (Fed. Cir. 1991).

Accordingly, the single prior art reference must properly disclose, teach or suggest each element of the claimed invention.

It is alleged in the Office Action that:

Regarding claim 1, Jones discloses an organic light emitting device (10 of Fig 4) comprising an electrode (251, 202 of Fig 3, lines 14-15 of column 9, lines 39-41 of column 8) a current self-limiting structure (253 and 203 of Fig 4, lines 43-44 of column 8, and 19-20 of column 9), and an organic stack (300 of Fig 5, lines 10-12 of column 9) between the electrode (251) and the current limiting structure (203, See Fig 4), applied in a thickness. Though Jones does not explicitly disclose that the layers 253 and 203 are current self-limiting structure, it is inherent since layers are made current self-limiting material (see lines 43-44 of column 8), thus prevent excessive current in the vicinity of a short in the organic light emitting device, since this is the inherent property of the current self limiting material.

Regarding claim 2, Jones discloses that the current self-limiting structure (253 of Fig 3) resides in contact with the electrode (251 of Fig 3).

Regarding claim 3, Jones discloses that the current self-limiting structure (253 and 203 of Fig 4) applied as a patterned lattice structure over the electrode (lines 21-22 of column 7, see Fig 8).

Regarding claim 4, Jones discloses that the current self-limiting structure (203) is applied as a grid defining windows in which the electrode (202 of Fig 4) is applied.

Regarding claim 5, though Jones does not specifically mention that the current self-limiting structure (253 and 203 of Fig 4) comprises an anisotropically conductive material, it is inherent since Jones used barium titanate as the current limiting component which is an anisotropically conductive material (see US 5414403).

Regarding claim 6, Jones discloses a photoresist material in contact with the electrode (202 of fig 4) and the current self-limiting structure (203 of Fig 4, see lines 51-54 of column 8).

It is further alleged in the Office Action that:

Regarding claim 7, Jones discloses that the current self-limiting structure (203 of Fig 4) resides between the electrode (202 of Fig 4) and a conducting layer (not shown in Fig, see lines 56-59 of column 8).

Regarding claim 8 Jones discloses that the conducting layer is embedded within the current self-limiting structure (203 of Fig 4, see lines 56-59 of column 8).

Regarding claim 9, Jones discloses that the conducting layer resides over the current self-limiting structure (lines 56-59 of column 8).

Claim 10 recites essentially the same limitation of claim 1. Thus claim 10 is rejected as claim 1 (see rejection of claim 1). In this case, Jones does not explicitly specify that the organic light emitting has increased the reliability. But it is inherent since Jones uses current self-limiting component in the device.

Claim 11 recites essentially the same limitation of claim 2. Thus claim 11 is rejected as claim 2 (see rejection of claim 2).

Claim 12 recites essentially the same limitation of claim 3. Thus claim 12 is rejected as claim 3 (see rejection of claim 3).

Claim 13 recites essentially the same limitation of claim 4. Thus claim 13 is rejected as claim 4 (see rejection of claim 4).

Claim 14 recites essentially the same limitation of claim 5. Thus claim 14 is rejected as claim 5 (see rejection of claim 3).

In response to Applicant's arguments filed on August 1, 2001, the Office Action states that:

In response to applicant's argument that the transition layer 253 has a thickness of approximately 10nm, which is incapable of acting as a current self-limiting layer because it is too thin, examiner could not find any support for this statement. First of all, applicant does not disclose in the specification what thickness is suitable of acting as a current self-limiting layer. Moreover, why a layer of 10nm thickness of current limiting material is incapable of current self-limiting? There is no discussion in the specification of the criticality of the thickness.

Applicants respectfully submit that *Jones* appears to disclose that the transition layers 203 and 253 are constructed using barium titanate, and specifically in col. 9, lines 16-18, that "[t]he transition layer 253 is preferentially formed from either LiF or barium and has a thickness of approximately 10 nms." Applicants respectfully submit that one having ordinary skill in the art would recognize that a 10nm thick transition layer 203 that is capable of injecting holes or electrons, as disclosed in *Jones* in col. 8, lines 42-43, is incapable of acting as a current self-limiting layer because it is too thin to provide such a characteristic.

Applicants have amended independent claims 1 and 10 to recite the feature of a "conductive" current self-limiting structure to further define the invention. Applicants respectfully submit that at least this feature of a "conductive" current self-limiting

structure is neither disclosed, taught, nor suggested by *Jones*. Indeed, the fact that *Jones* discloses that the transition layer 203 is capable of injecting holes and electrons implies that the transition layer cannot be a true conductor because such electron and hole injection occurs through tunneling, not conduction. *Jones*, in col. 8, lines 43-44, states that "[t]he transition layer 203 may comprise barium titanate or other high dielectric materials." As known to those having ordinary skill in the art, a high dielectric material does not allow conduction, but merely allows tunneling. Therefore, it is clear that *Jones* fails to anticipate that their transition layer 203 could behave as a current self-limiting structure, because it could never be a true conductive layer in the first instance.

Furthermore, as mentioned in the previous response submitted August 1, 2001, while Applicants indeed mention in the specification of the instant application that barium titanate is a current self-limiting material, Applicants also state on page 8, lines 23-24 that the "CSL layer 105 can be applied in a thickness sufficient to prevent excess current in the vicinity of a short." Applicants respectfully submit that it cannot be inherent for the transition layers 203 and 253 of *Jones* to function as current self-limiting materials because the thickness limitation (preferentially 10 nms) placed on the transition layers 203 and 253 by *Jones* would prevent such functionality because, as known to those having ordinary skill in the art, such a thin layer would likely melt.

However, as mentioned above, to advance prosecution of the application, Applicants have amended independent claims 1 and 10 to recite the feature of "a conductive current self-limiting structure." Applicants respectfully submit that support for this feature can be found in the specification on page 7, lines 9-12 where it is stated that "[a]nother class of current limiting materials is composed of polymer composites, in which the polymer contains inorganic (typically metallic) conducting particles at various concentrations such that a conducting path can be established through the material."

Applicant respectfully submits that at least this feature of a conductive current self-limiting structure is neither disclosed, taught nor suggested by *Jones*.

Further, as mentioned in the previous response dated March 20, 2001, *Jones* mentions in the Background of the Invention section that “[e]dge shorting between the cathode and anode layers is another problem affecting most conventional OLED devices. Edge shorting reduces the illumination potential of the display. Edge shorting is the channeling of light within the organic layers. As a result of the channeling, light is not directed towards the viewer.” However, nowhere does *Jones* disclose, teach or suggest that it would be desirable to have a structure between a conductor and the organic stack that limits the flow of current in the vicinity of an electrical short. Indeed, other than a brief mention of edge shorting in the Background of the Invention section and a brief mention of restricting light emission in directions parallel to the planar substrate in the Summary of the Invention section, nowhere does *Jones* disclose, teach or suggest the desirability, much less any structure or method, of limiting the flow of current in the vicinity of a short in an OLED device.

The Office Action states that *Jones* discloses “a current self-limiting structure (253 and 203 of Fig 4, lines 43-44 of column 8, and 19-20 of column 9).” Applicants respectfully submit that column 8, lines 43-44 of *Jones* merely discloses that a “sloped conductor pad 202 is surrounded by a transition layer 203 capable of injecting holes or electrons. The transition layer 203 may comprise barium titanate or other high dielectric constant materials.” Applicants respectfully submit that nowhere is the transition layer 203 described as a conducting structure, much less a current self-limiting structure. Furthermore, the 10nms thickness limitation placed on the transition layers 203 and 253 by *Jones* is further evidence that *Jones* never intended such layers to function as current self-limiting layers because such thin layers would likely melt in the vicinity of a short.

With respect to claim 2, Applicants respectfully disagree with the statement in the Office Action that "Jones discloses that the current self-limiting structure (253 of Fig 3) resides in contact with the electrode (251 of Fig 3)." As mentioned above, Applicants respectfully submit that, because *Jones* fails to disclose, teach or suggest a conductive current self-limiting structure, it is impossible for *Jones* to disclose a current self-limiting structure residing in contact with an electrode.

With respect to claim 3, Applicants respectfully disagree with the statement in the Office Action that "Jones discloses that the current self-limiting structure (253 and 203 of Fig 4) applied as a patterned lattice structure over the electrode (lines 21-22 of column 7, see Fig 8)." Applicants submit that column 7 lines 21-22 merely disclose that "[t]he substrate 100 may underlie a plurality of different subpixels or cells 10." Furthermore, Applicants respectfully submit that with respect to FIG. 8, *Jones* merely teaches that the planar substrate 100 may include a matrix 800. The matrix 800 includes matrix lines 801 or 802 which are capable of carrying current or voltage pulses of selected magnitude. See column 8, lines 37-41). It appears that the configuration shown in FIG. 8 of *Jones* is merely a way of distributing current and voltage to the cells 10, and fails to disclose, teach or suggest applying a current self-limiting structure over an electrode in the form of a patterned lattice structure as recited in claim 3.

Similarly, with respect to claim 4, nowhere does *Jones* disclose, teach or suggest applying the current self-limiting structure as a grid defining windows in which an electrode is applied.

With respect to claim 5, Applicants respectfully disagree with the statement in the Office Action that "though Jones does not specifically mention that the current self-limiting structure (253 and 203 of Fig. 4) comprises an anisotropically conductive material, it is inherent since Jones used barium titanate as the current limiting component

which is an anisotropically conductive material (see US 5414403).” Applicants respectfully submit that *Jones* fails to disclose, teach or suggest that the transition layers 203 and 253 are a conductive current self-limiting structure, and instead discloses merely that the transition layers are high dielectric constant materials.

With respect to claim 6, Applicants respectfully submit that *Jones*, in column 8, lines 51-54 appears to disclose that the slope of the pad 202 (the conductor pad 202 that is surrounded by the transition layer 203) is achieved by undercutting the edges. The undercutting is achieved through resist or bilayer loss. Applicants respectfully submit that nowhere does *Jones* disclose, teach or suggest a photoresist material in contact with a conductive current self-limiting structure and an electrode.

With respect to claim 7, Applicants respectfully disagree with the statement in the Office Action that “*Jones* discloses that the current self-limiting structure (203 of Fig 4) resides between the electrode (202 of Fig 4) and a conducting layer (not shown in Fig, see lines 56-59 of column 8).” As mentioned above, Applicants respectfully submit that, because *Jones* fails to disclose, teach or suggest a conductive current self-limiting structure, it is impossible for *Jones* to disclose a current self-limiting structure between an electrode and a conducting layer.

With respect to claims 8 and 9, Applicants respectfully submit that *Jones* fails to disclose, teach or suggest a conductive current self-limiting structure.

With respect to claims 11 and 14, Applicants respectfully submit that *Jones* fails to disclose, teach or suggest the current self-limiting structure.

Accordingly, Applicants respectfully submit that amended independent claims 1 and 10 are allowable in that they recite features and steps that are neither disclosed, taught nor suggested by *Jones*. Furthermore, Applicants respectfully submit that dependent claims 2-9 and 11-14 are allowable for at least the reason that they depend either directly

or indirectly from allowable independent claims. *In re Fine*, 837 F.2d 1071, 5 U.S.P.Q.2d 1596, 1600 (Fed. Cir. 1988).

Rejections Under 35 U.S.C. §103

Claim 15 stands rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over *Jones*. Applicant respectfully submits that although the Office Action only mentions claim 15, it appears that claims 15-28 are rejected under 35 U.S.C. §103(a) and Applicants will respond accordingly. For a claim to be properly rejected under 35 U.S.C. §103, "[t]he PTO has the burden under section 103 to establish a *prima facie* case of obviousness. It can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references." *In re Fine*, 837 F.2d 1071, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988) (Citations omitted).

It is stated in the Office Action that:

Regarding claim 15, Jones discloses an organic light emitting device (10 of Fig 4) comprising an electrode (251, 202 of Fig 3, lines 14-15 of column 9, lines 39-41 of column 8) a current self-limiting structure (253 and 203 of Fig 4, lines 43-44 of column 8, and 19-20 of column 9), and an organic stack (300 of Fig 5, lines 10-12 of column 9) between the electrode (251) and the current limiting structure (203, See Fig 4). Though Jones does not explicitly disclose that the layers 253 and 203 are current self-limiting structure, it is inherent since layers are made current self-limiting material.

But Jones fails to disclose that the current self-limiting structure located non-adjacent the organic stack.

However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to rearrange cathode layer (251) and CSL layer (253) so that CSL layer of Jones's device is non adjacent to organic stack 300, since it has been held that rearranging parts of an invention involves only routine skill in the art. *In Re Japikse*, 86 USPQ 70.

Claim 16 is rejected as claim 2 (see rejection of claim 2).

Claim 17 is rejected as claim 3 (see Rejection of claim 3).

Claim 18 is rejected as claim 4 (see rejection of claim 4).

Claim 19 is rejected as claim 5 (see rejection of claim 5).

Claim 20 is rejected as claim 6 (see rejection of claim 6).
Claim 21 is rejected as claim 7 (see rejection of claim 7).
Claim 22 is rejected as claim 8 (see rejection of claim 8).
Claim 23 is rejected as claim 9 (see rejection of claim 9).
Claim 24 is rejected as claim 10 (see rejection of claim 10).
Claim 25 is rejected as claim 11 (see rejection of claim 11).
Claim 26 is rejected as claim 12 (see rejection of claim 12).
Claim 27 is rejected as claim 13 (see rejection of claim 13).
Claim 28 is rejected as claim 14 (see rejection of claim 14).

Applicant has amended independent claims 15 and 24 to recite the feature of "a conductive current self-limiting structure." For at least the reasons stated above, Applicants respectfully submit that *Jones* fails to disclose, teach or suggest to one having ordinary skill in the art that its transition layer 203 could be a current self-limiting structure for at least the reasons that *Jones*' transition layer 203 is not a conductive structure and is too thin to be an effective current self-limiting structure.

Accordingly, Applicants respectfully submit that *Jones* fails to render obvious claims 15 and 24. Furthermore, Applicants respectfully submit that dependent claims 16 23 and 25-28 are allowable for at least the reason that they depend either directly or indirectly from allowable independent claims. *In re Fine*, 837 F.2d 1071, 5 U.S.P.Q.2d 1596, 1600 (Fed. Cir. 1988).

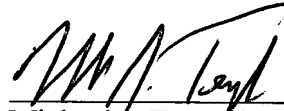
CONCLUSION

For at least the foregoing reasons, Applicants respectfully request that all outstanding rejections be withdrawn and that all pending claims of this application be allowed to issue. If the Examiner has any comments regarding Applicants' response or intends to dispose of this matter in a manner other than a notice of allowance, Applicants request that the Examiner telephone Applicants' undersigned attorney.

Respectfully submitted,

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**ANNOTATED VERSION OF MODIFIED CLAIMS TO SHOW CHANGES
MADE**

In accordance with 37 C.F.R. § 1.121, please find below the amended claims in which the inserted language is underlined (“ ”) and the deleted language is enclosed in brackets (“[]”):

1 1. (Twice Amended) An organic light emitting device, comprising:
2 an electrode;
3 a conductive current self-limiting structure adjacent said electrode; and
4 an organic stack located adjacent said electrode [between said electrode
5 and said current self-limiting structure, where said current self-limiting structure is
6 applied in a thickness sufficient to prevent excessive current in the vicinity of a
7 short in said organic light emitting device].

1 10. (Twice Amended) A method for increasing the reliability of an organic
2 light emitting device, comprising the steps of:
3 forming an organic light emitting device; and
4 incorporating a conductive current self-limiting structure within said
5 organic light emitting device [, said current self-limiting structure applied in a thickness
6 sufficient to prevent excessive current in the vicinity of a short in said organic light
7 emitting device].

1 15. (Once Amended) An organic light emitting device, comprising:
2 an electrode;
3 a conductive current self-limiting structure adjacent said electrode; and
4 an organic stack located adjacent said electrode [between said electrode
5 and said current self-limiting structure, said current self-limiting structure
6 located non-adjacent said organic stack].

1 24. (Once Amended) A method for increasing the reliability of an organic
2 light emitting device, comprising the steps of:
3 forming an organic light emitting device; and
4 incorporating a conductive current self-limiting structure within said
5 organic light emitting device [and non-adjacent said organic stack].